SuperJANET-5 & UKLight

ONT Workshop – Tokyo

Peter Clarke
Peter.clarke@ed.ac.uk

7&8st Sept 2006

1. UKLight & SuperJANET-5
2. Research projects on UKLight
3. The Questions

Up until ~ now we have had a

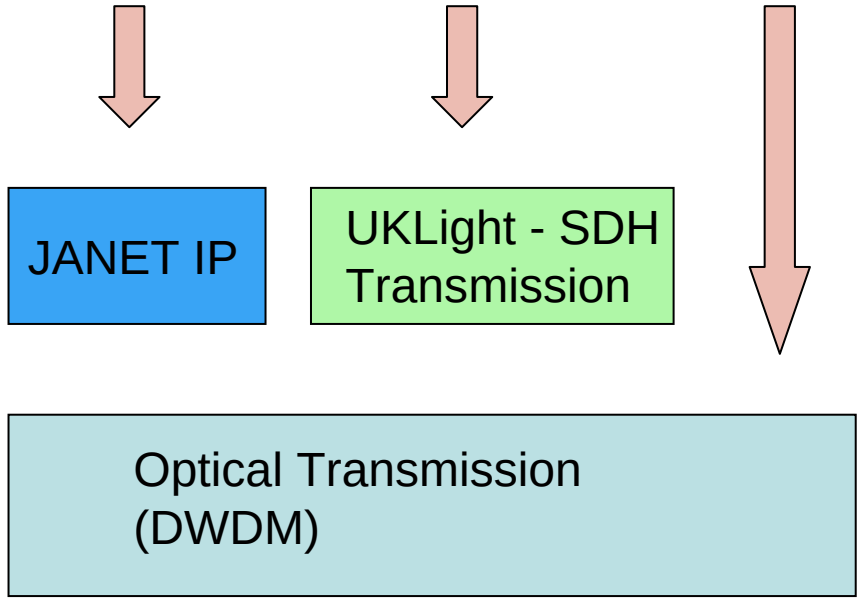
- A national NREN production Network called SuperJANET4 – run by UKERNA
- A separate R&D “lightpath” network called UKLight

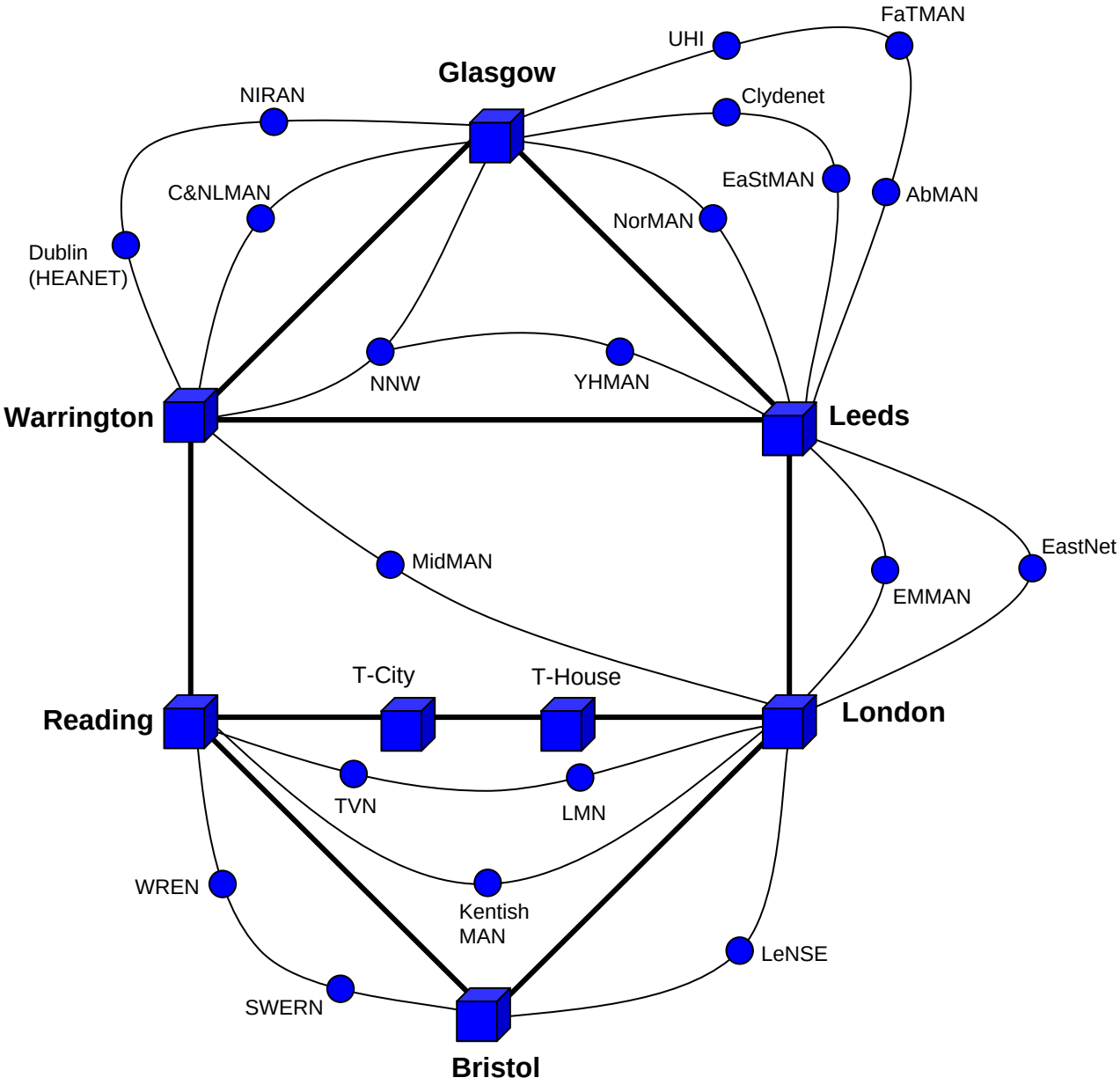
UKlight was conceived on 2001 and finally built ~ 2003

As of 2006 UKLight will be integrated into the new SuperJANET-5 infrastructure

SuperJANET5 Network Services

- JANET IP service
  - High capacity
  - Resilient engineering
  - Dual connection to each Regional Network
- Point to point circuits (wavelengths / lightpaths / lambdas…)
  - UKLight style
    - 50Mb/s – 2.5Gb/s
  - Optical layer
    - 1GE, 2.5 Gb/s, 10Gb/s




FaTMAN
UHI
Glasgow
NIRAN
Clydenet
EaStMAN
AbMAN
C&NLMAN
NorMAN
Dublin
(HEANET)
NNW
YHMAN
Warrington
Leeds
MidMAN
EastNet
EMMAN
T-City
T-House
Reading
London
TVN
LMN
WREN
Kentish
MAN
LeNSE
SWERN
Bristol

SuperJANET5
Optical Transmission Equipment

- Optical Transmission layer
- DWDM (Multiple wavelength) equipment
  - Ciena CoreStream
    - Up to 96 waves per fibre
  - Ciena 4200
    - Up to 32 waves per fibre

Research Capacity

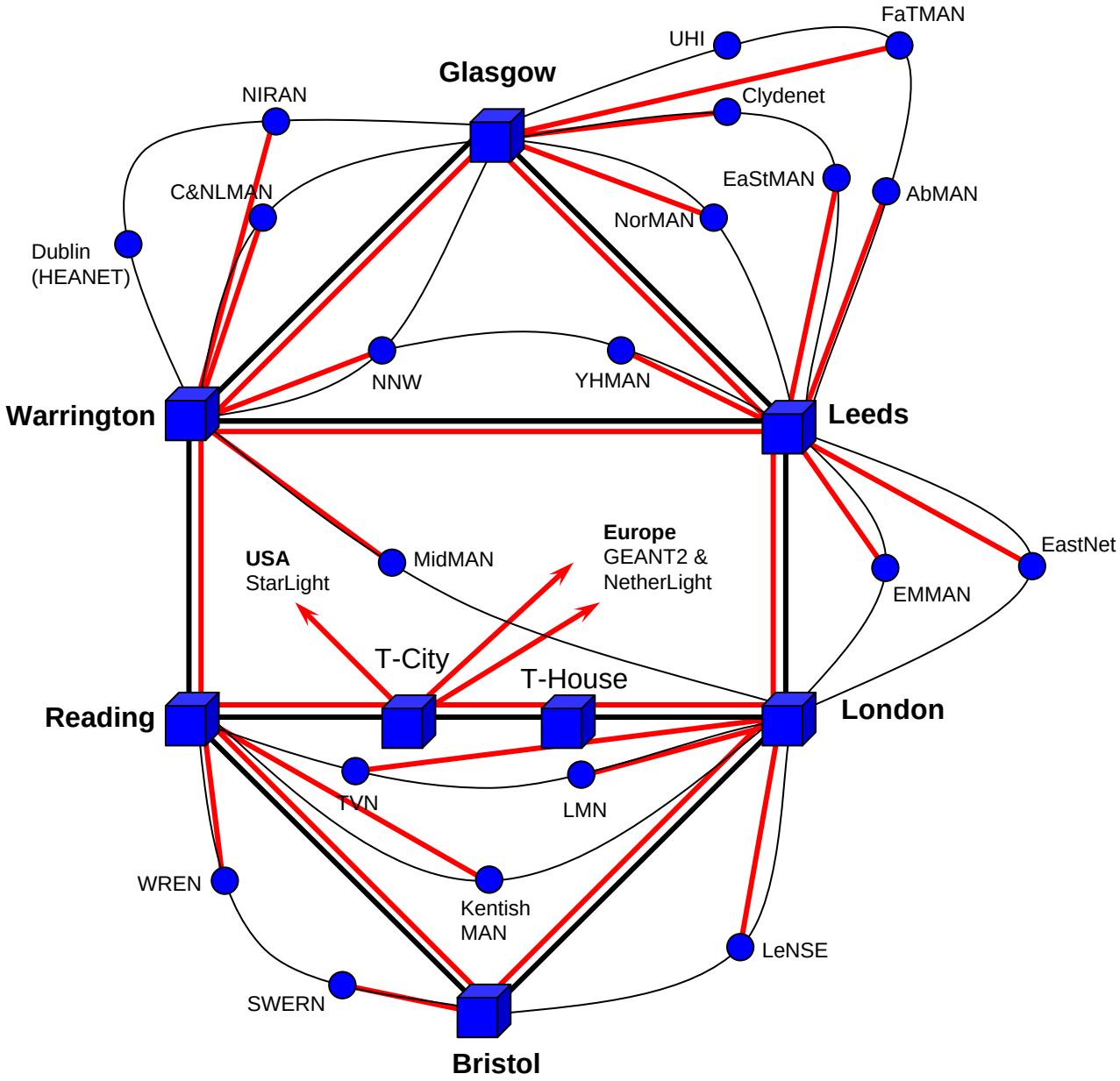
- 10 Gb/s for each Regional Network in first instance
- Delivered to ONE of the Regional Network Entry Points (RNEPs)
- UKLight network will be migrated to SuperJANET5 using this capacity

SuperJANET5 Research capacity

Integrating UKLight with SuperJANET5

Initially a 10 Gbit/s circuit available to every RN.

More capacity will be added according to demand.



Snapshot of UKLight Connectivity for 8 March 06…

Task	UKLight Link	Bandwidth	Status
CDF	UCL - Chicago (FNAL)	1*1.0 Gbit/s	Active
VLBI	Man - Amsterdam (Dwingeloo)	1*1.0 Gbit/s	Active
	Man – Amsterdam (JIVE)	1*600 Mbit/s	Required Mar 06
	Man – Chicago (Haystack)	1*650 Mbit/s	Active
ATLAS	RAL – CERN*	4*1.0 Gbit/s	Active
	RAL - Lanc	1*1.0Gbit/s	Active
	Lanc - Man	1*1.0Gbit/s	To be connected
	Lanc - Edinburgh	1*1.0Gbit/s	Required May 06
HPC	UCL - Chicago	1*300 Mbit/s	Active
	Man - Chicago	1*300 Mbit/s	Active
	UCL - Man	1*300 Mbit/s	Active
	DL - Chicago	1*100 Mbit/s	To be reconnected
	DL - UCL	1*300 Mbit/s	To be reconnected
	DL - MAN	1*300 Mbit/s	To be connected
e-Health	RAL-DL	1*750 Mbit/s	Active

* UK-HEP connection

SuperJANET5 summary

- Telco grade transmission infrastructure dedicated to JANET
- Suppliers: Verizon Business (was MCI) & Ciena
- Fibre everywhere
  - 5500km
- Designed for resilience
  - Dual entry points to RNs
  - All RN requirements met
- Ability to add additional bandwidth at marginal costs

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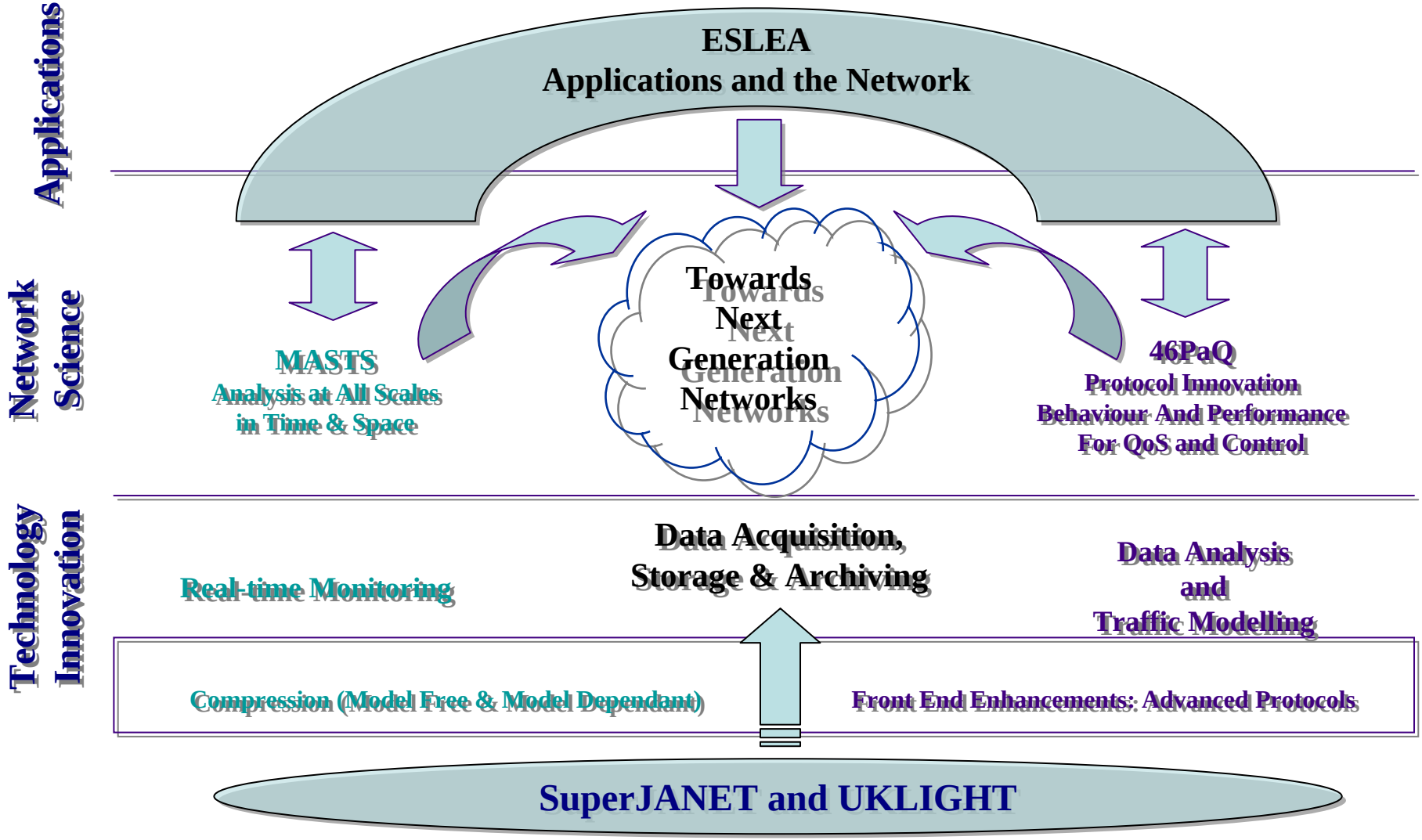
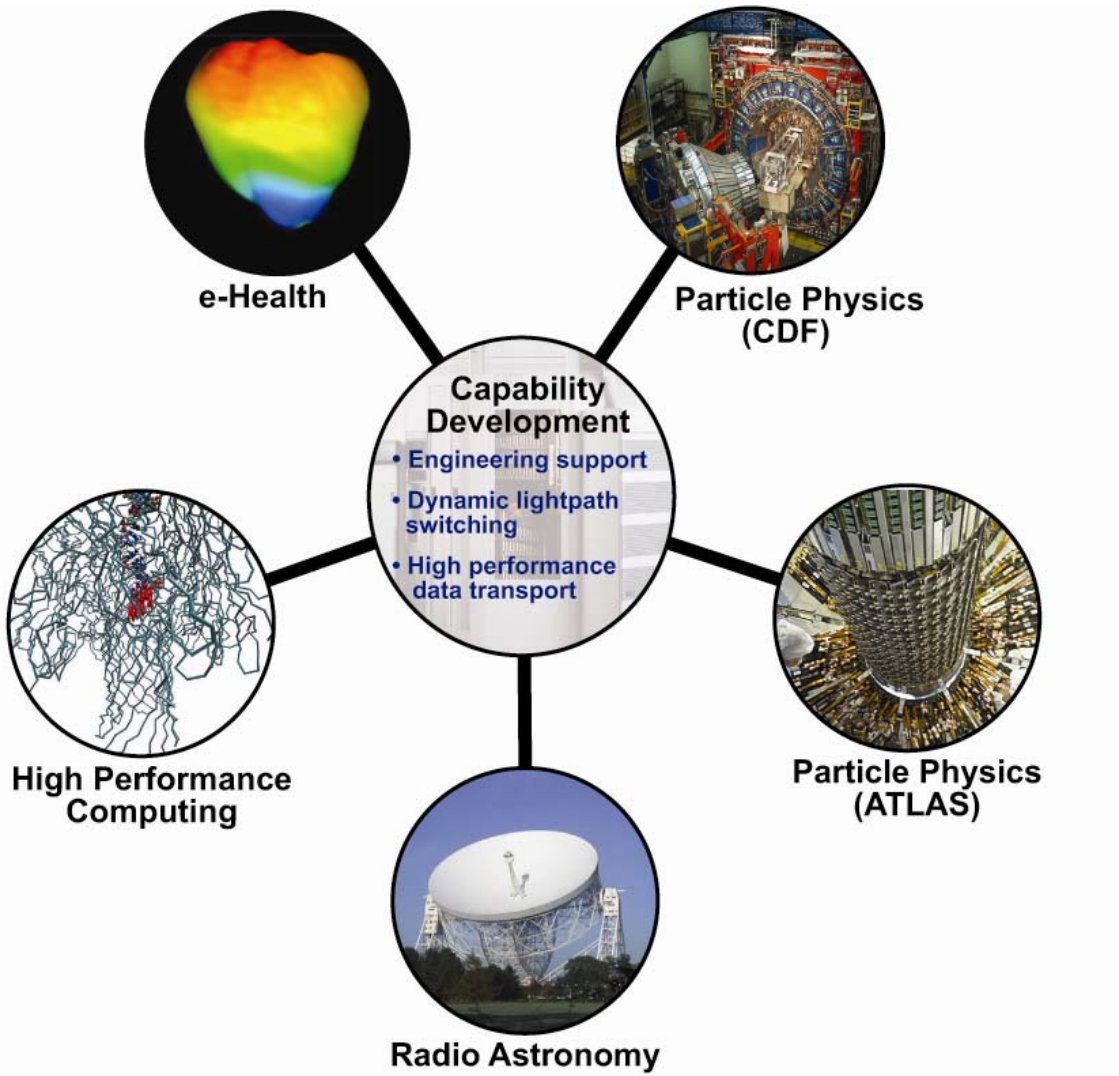
UKLIGHT ‘network’ projects

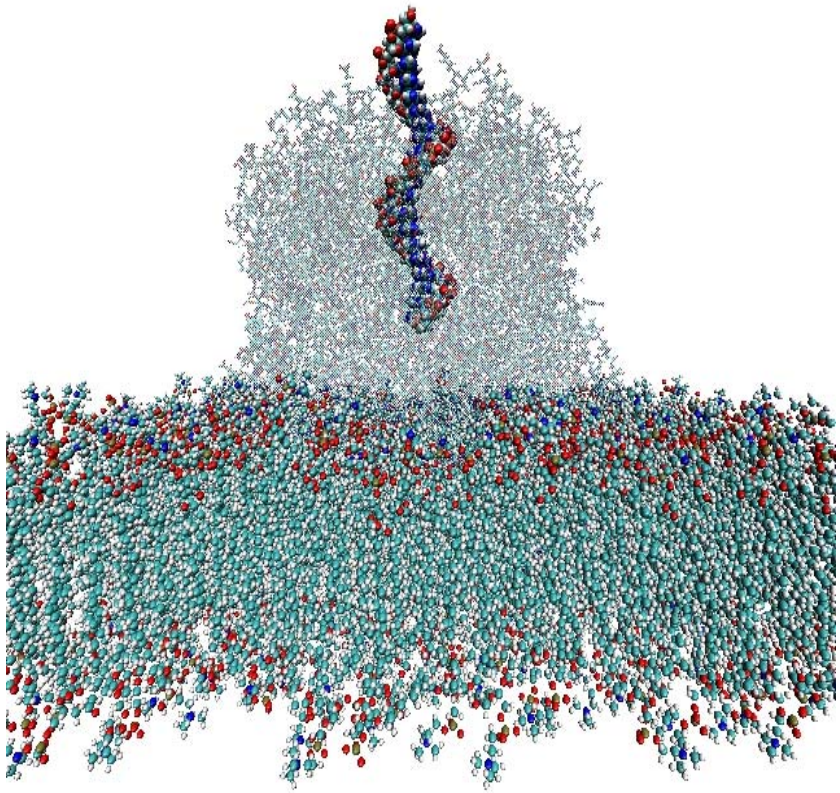


ESLEA is the first widely scoped project to exploit UKLight for a range of scientific applications.



The SPICE Project:

Thanks to Shantenu Jha & Matt Harvey
P.Coveney et al.



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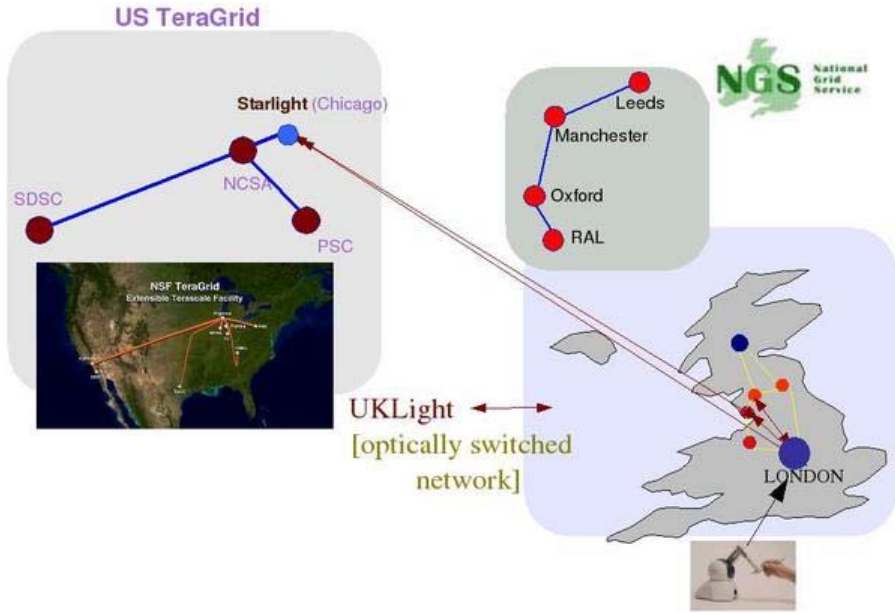
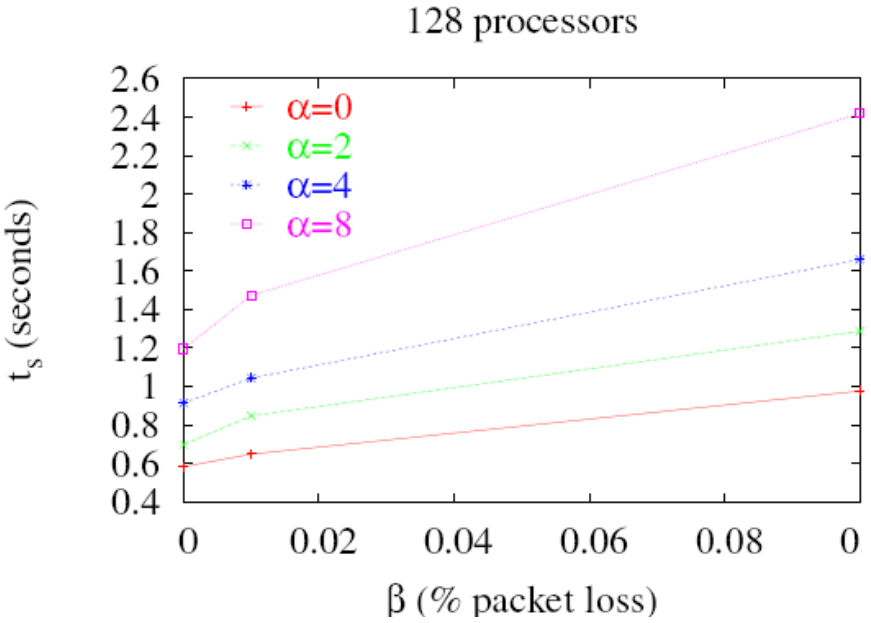
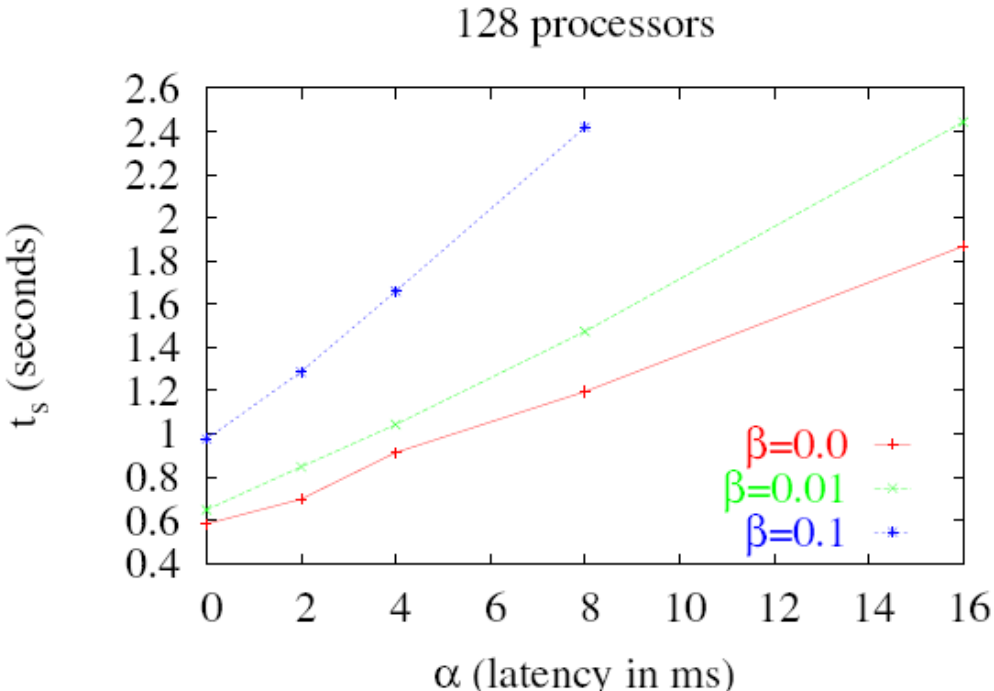




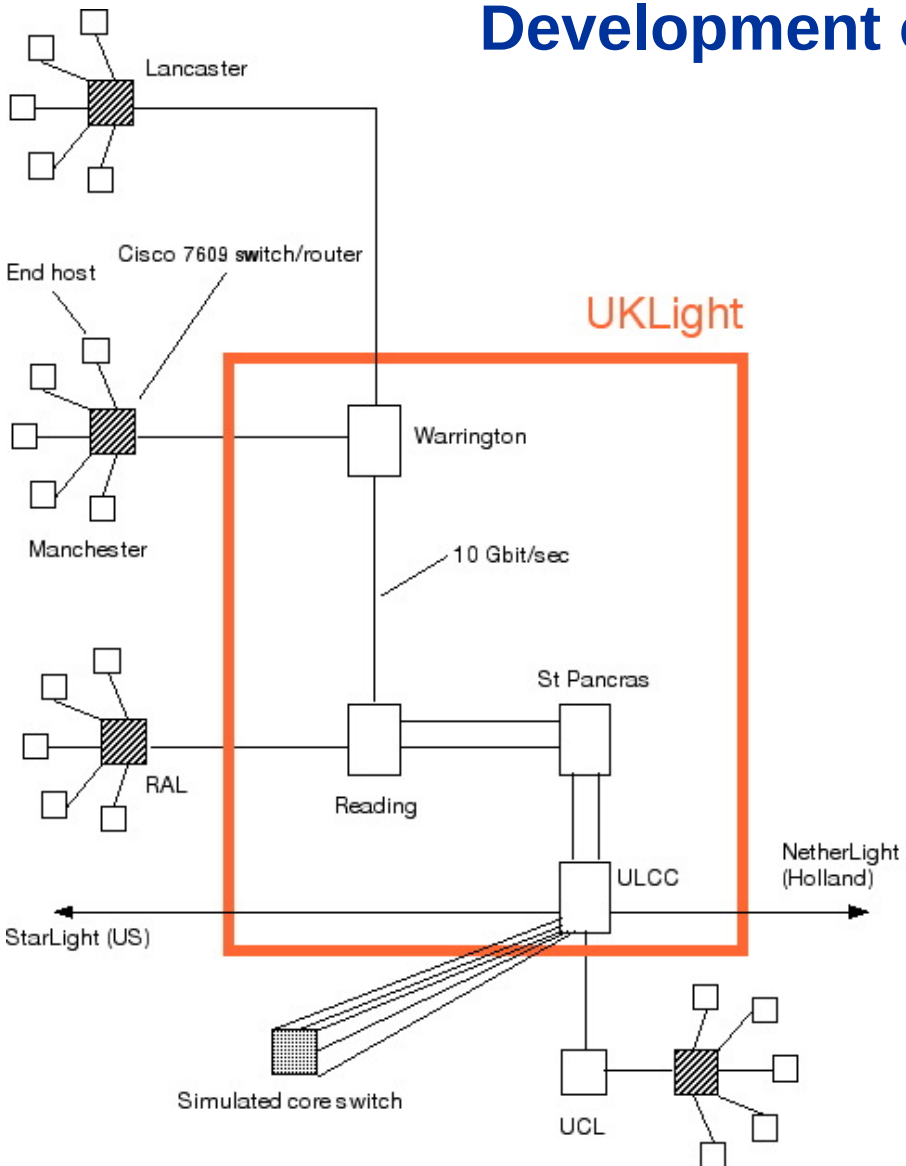
Y axis is a measure of speed of the simulation

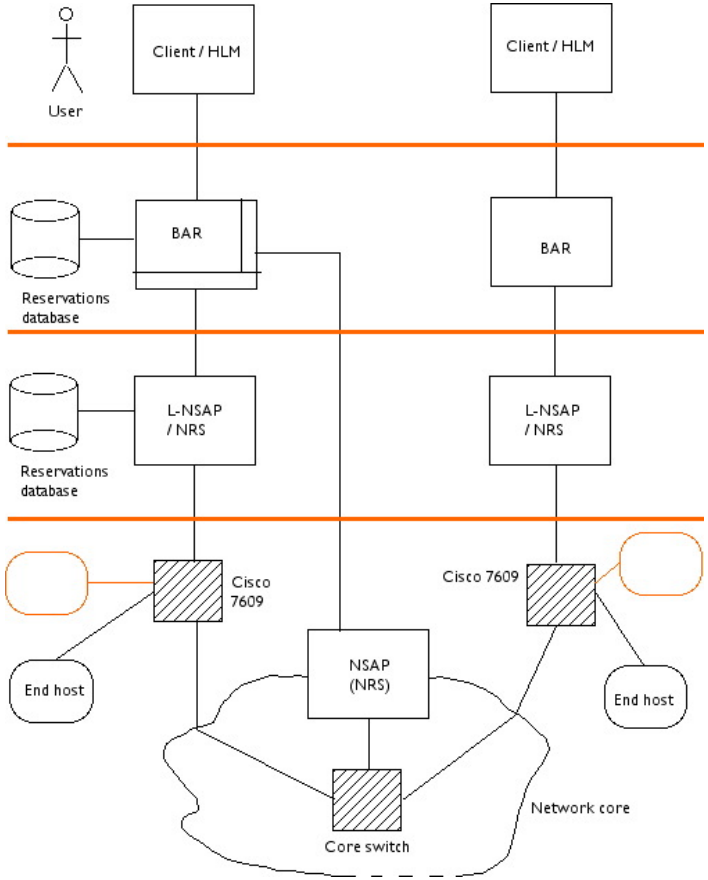


Preliminaty results

Thanks to:
Shanetnu Jha, Matt Harvey

Development of pilot switched service





New (just approved) :Dark Fibre Testbed

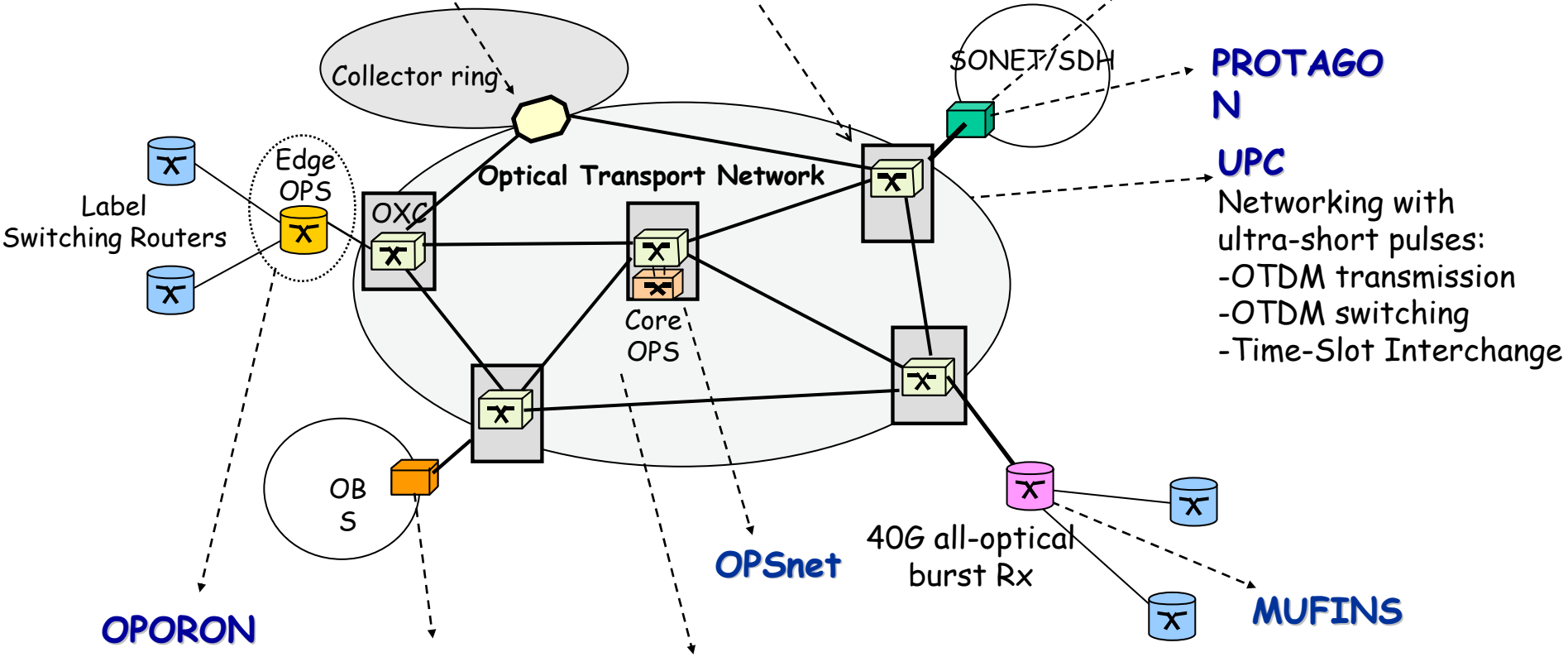
- Connects Essex ⇔ Cambridge ⇔ University College London
- These are Photonics Research Groups

Example: Research at ESSEX University

TRIUMPH
Develop switching node for:
- Bit-rate adaptation
- Multiwavelength regen

LUCIFER
Control plane and network resource provisioning for Grid and eScience

HIPNET
Modelling end to end QoS across heterogeneous nets



PROTAGON

UPC
Networking with ultra-short pulses:
-OTDM transmission
-OTDM switching
-Time-Slot Interchange

OPSnet

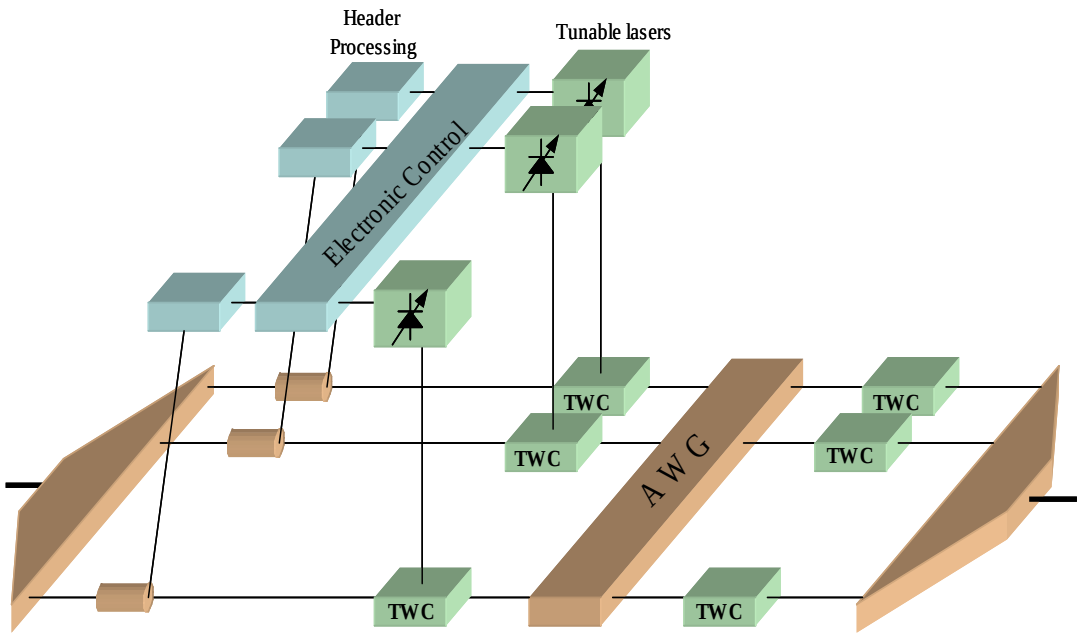
MUFINS

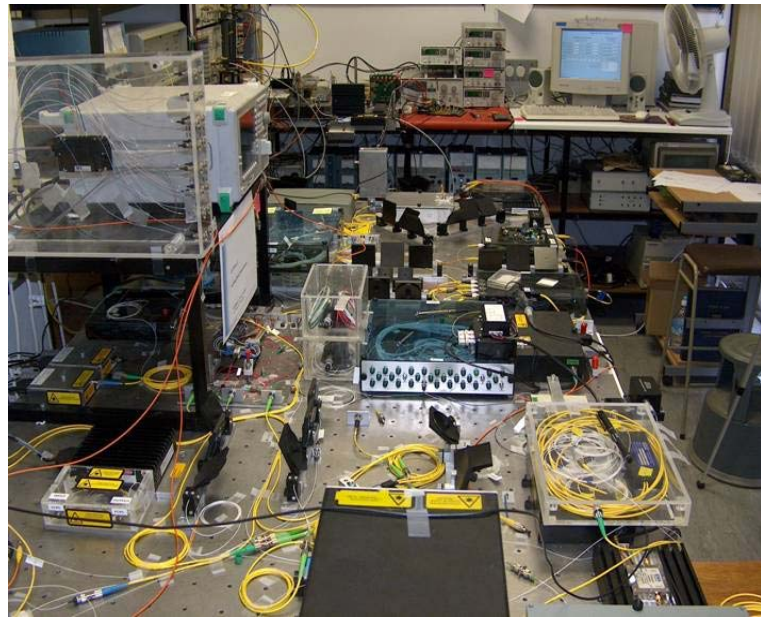
OPORON

ephoton/ephoton+

UFORIC
Hardware based CBR with optical impairments

Packet/Burst Switching Nodes (Optical Packet/Burst Router)





- A wavelength modular design
- Supports variable length optical packet/burst at 40 Gbps
- Switching is based on wavelength conversion and selection
  - Wavelength Conversion is based on dual pump FWM
  - Routing is based on wavelength selection using AWG
- Control is based on fast electronic processing of the optical header and tuning is achieved with ultra-fast tunable lasers

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   - **It already has – the efforts of last 5 years have shaped the new national network in a fundamental way.**
   - **It has provided a pervasive national R&D network available to all**

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   - RAL ⇔ CERN, Lancaster ⇔ NIKHEF, London ⇔ Fermilab
   - Jodrell Bank ⇔ Dwingeloo & Haystack
   - UK HPCx& CSRA HPC facility ⇔ Teragrid

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3. **Roadmap**
   - 40 Gbit/s transmission